

Magnesium Diboride Superconducting Stator Coils for Electric Propulsion Systems, Phase I

Completed Technology Project (2006 - 2006)



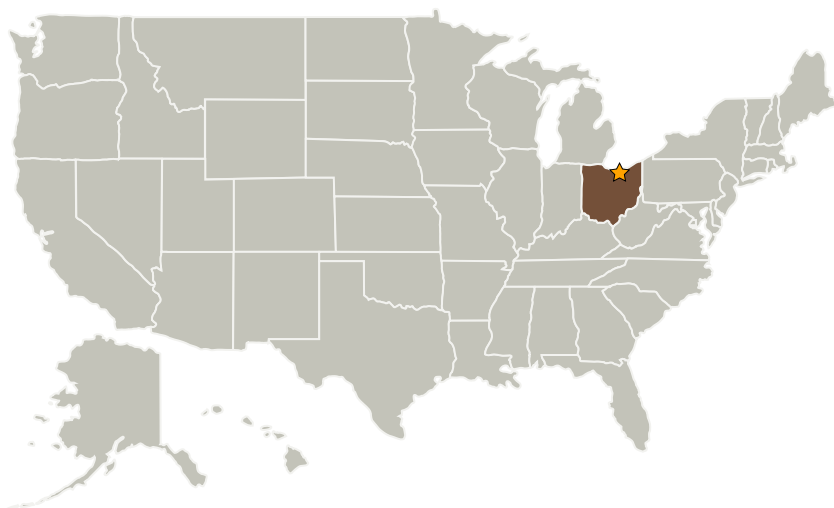
Project Introduction

Many are pursuing the development of electric propulsion systems for large aircraft due to the potential of being cleaner, quieter, lighter, and more versatile than current platforms and because the use of liquid hydrogen (LH2) fuel in these systems decreases our dependence on petroleum. It is desirable to have very light components, such as the stator, for these electric propulsion systems. Superconducting stator coils can be lighter weight than cryogenically cooled copper stator coils. The recent development of magnesium diboride (MgB2) superconducting wires makes possible the potential to have much lighter weight superconducting stator coils than with any other metal or ceramic superconductor. The MgB2 superconductor, cooled in the available liquid hydrogen fuel, is the ideal candidate wire material for stator coils for large aircraft motors. The lighter weight coils, especially in the stator, will enable a lighter weight motor. During the Phase I we will demonstrate using this magnesium diboride superconductor wire in diamond wound stator coil form. This will show feasibility of fabricating full size diamond patterned stator coils in a Phase II effort.

Anticipated Benefits

Potential NASA Commercial Applications: Commercialization of magnesium diboride superconducting wires will allow less expensive and more open MRI systems for medical use, and lower cost and more efficient power utility applications such as transformers, motors, generators, fault current limiters, and SMES.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Hyper Tech Research, Inc.	Supporting Organization	Industry	Columbus, Ohio

Primary U.S. Work Locations

Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Matthew Rindfleisch

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors